Five-Year Review Report

Third Five-Year Review Report
for
Hollingsworth Solderless Terminal Company
Ft. Lauderdale
Broward County, Florida

December 2005

PREPARED BY:

United States Environmental Protection Agency
Region 4
Athens, Georgia

Approved by: Date:

12/20/05

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
BGS	Below Ground Surface
BCEQCB	Broward County Environmental Quality Control Board
CAMU	Corrective Action Management Unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DCE	Dichloroethene
DQO	Data Quality Objective
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Difference
FL DEP	Florida Department of Environmental Protection
HSTC	Hollingsworth Solderless Terminal Company
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PRP	Potentially Responsible Party
PSD	Performing Settling Defendant
QAPP	Quality Assurance Project Plan
R4LIMS	Region 4 Laboratory Information Management System
RA	Remedial Action
RAMP	Remedial Action Master Plan
RAO	Remedial Action Objective
RD	Remedial Design
ROD	Record of Decision
SDWA	Safe Drinking Water Act
SVE	Soil Vapor Extraction
TCE	Trichloroethene
VOC	Volatile Organic Compound

Executive Summary

The remedy for the Hollingsworth Solderless Terminal Company (HSTC) Superfund Site in Ft. Lauderdale, Broward County, Florida included abandonment of the old injection well and all other PVC wells, treatment of VOC contaminated soil, treatment of VOC contaminated groundwater, and injection of treated groundwater near the site. The trigger for this third Five-Year Review was the signing of the second Five-Year review by the Director of the Waste Management Division for US EPA Region 4 on April 3, 2000.

The assessment of this Five-Year Review found that the remedy was constructed in accordance with the requirements of the Record of Decision (ROD). One Explanation of Significant Difference (ESD) was issued to remove additional contaminated soils, not treated during the original remediation. An in-situ bioremediation pilot test is underway to address remaining, deeper groundwater contamination associated with Plant #1 of the HSTC Site. This bioremediation remedy cannot be assessed in this Five-Year Review, as the initial results are not yet available. The immediate threats have been addressed and the remedy is expected to be protective when groundwater cleanup goals are achieved. Some issues are cited in this Five-Year Review which need to be addressed to ensure the protectiveness of the Site.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Hollingsworth Solderless Terminal Co.		
EPA ID: FLD004119681		
Region: 4	**State:** FL	**City/County:** Ft. Lauderdale/Broward
SITE STATUS		
NPL status: ☒ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ☒Operating ☐ Complete		
Multiple OUs? ☐ YES ☒ NO	**Construction completion date:** 06/04/1993	
Has site been put into reuse? ☐ **YES** ☒ NO		
REVIEW STATUS		
Lead agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency		
Author name: Douglas Jager		
Author title: Environmental Scientist	**Author affiliation:** U.S. EPA, Region 4, SESD	
Review period: 2 / 28 / 2005 to 8 / 31 / 2005		
Date(s) of site inspection: 2 / 28 / 2005		
Type of review: ☐ Post-SARA ☒ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion)		
Review number: ☐ 1 (first) ☐ 2 (second) ☒ 3 (third) ☐ Other (specify)		
Triggering action: ☐ Actual RA On-site Construction at OU #___ ☐ Actual RA Start at OU# NA ☐ Construction Completion ☒ Previous Five-Year Review Report ☐ Other (specify)		
Triggering action date: 4 / 3 / 2000		
Due date ***(five years after triggering action date)*:** 4 / 3 / 2005		

Issues:

One of the elements of the selected remedy, as stated in the ROD, is the proper abandonment of the old injection well used by Hollingsworth Solderless Terminal Company (HSTC) in the 1970s. This has not yet been accomplished.

The remedial objectives for groundwater remediation have not yet been accomplished, specifically meeting State and federal maximum contaminant levels (MCLs) for volatile organic compounds (VOCs).

Additional attention needs to be directed toward the inspection and maintenance of the groundwater monitoring well network at the HSTC Site. Some groundwater monitoring wells were found to be damaged and/or not properly secured.

Five-Year Review Summary Form (continued)

Groundwater monitoring wells are not clearly marked.

No Quality Assurance Project Plan (QAPP) or associated Data Quality Objectives (DQOs) were located during the view of documents for this Five-Year Review.

Detailed information on the issues found through this third Five-Year Review can be found in Section *VIII*.

Recommendations and Follow-up Actions:

- Properly abandon the old injection well;
- Continue the bioremediation treatability study and continue to monitor groundwater to assess the results;
- Insure that more routine inspection and maintenance of the wellheads at the HSTC Site are incorporated into the O&M program for the HSTC Site;
- Insure that wells heads are clearly marked with labeling that uniquely identifies the monitoring well;
- Properly abandon damaged wells and secure all wellheads in the HSTC Site groundwater monitoring network; and
- Develop a QAPP and associated DQOs are needed for the HSTC Site per requirements of EPA order 5360.1.

Protectiveness Statement(s):

The remedial action at the HSTC Site has not been completely effective in accomplishing the remedial objectives, however, the remedy undertaken is protective in the short term. Contaminants remain present in the groundwater, above the ROD's remediation goals. No known industrial or private wells exist within the delineated plume of contamination. The issues noted above do not constitute immediate threats to human health. The old injection well is still not properly abandoned, as required in by the ROD. Although the old injection well is currently buried, no documentation of proper abandonment exists. Thus, although it is no longer an immediate threat by indiscriminate dumping of wastes, the well could be acting as a conduit for cross-contamination between zones. An in-situ bioremediation pilot test was designed and implemented for the areas of the South and West Drainfields, associated with Plant #1 of the HSTC Site. This bioremediation pilot test was conducted from April though June 2005. The effectiveness of this remedy could not be evaluated in this third Five-Year Review, as the data is not currently available.

More inspection and maintenance of the groundwater monitoring well network needs to be incorporated into the O&M program. Low value monitoring wells and the old injection well need to be properly abandoned.

Long-Term Protectiveness:

Long-term protectiveness of the remedial action should be verified by obtaining additional groundwater sample locations to fully evaluate potential migration of the contaminant plume down gradient (west and south) from Plant #1. These additional sample locations will also be vital in evaluating the effectiveness of the bioremediation remedy. Current y, data indicate that the excavation and removal of the contaminated soils in the South and West drainfields during February 2002 significantly reduced groundwater contaminants. However, visibly contaminated soil remained at the eight feet below ground surface depth after excavations were completed. As a consequence, Shaw Environmental, Inc., was tasked to develop an in-situ bioremediation pilot test for the areas of the South and West Drainfields, associated with Plant #1 of the HSTC Site. This bioremediation pilot test was conducted from April though June 2005. The bioremediation will require further monitoring to continue to be monitored to judge the effectiveness of long term protection offered by this remedy.

Other Comments:

While the remediation is progressing positively for the HSTC Site, the issues cited in this Five-Year Review need to be addressed to ensure the long-term protectiveness of the site.

Hollingsworth Solderless Terminal Company Superfund Site
Fort Lauderdale, Broward County, Florida
Third Five-Year Review Report

I. Introduction

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency, Region 4, conducted the five-year review of the remedy implemented at the HSTC Superfund Site in Ft. Lauderdale, Florida. This review was conducted by the Science and Ecosystem Support Division (SESD) for the entire site from February 2005 through August 2005. This report documents the results of the review.

This is the third Five-Year Review for the HSTC Site. The triggering action for this policy review is the signing of the second Five-Year review by the EPA Region 4 Waste Division Director on April 3, 2000. The Five-Year Review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Event	Date
Manufactured solderless electrical terminals. Process included heat treatment in molten salt baths, degreasing, and electroplating. For ~8 years, the company disposed of wash water and process wastewater contaminated with trichloroethene and heavy metals into drain fields and an injection well located onsite, resulting in contamination of soil and groundwater.	1968 - 1982
Initial investigations regarding environmental issues began when the Broward County Environmental Quality Control Board (BCEQCB) began investigating the disposal practices of the HSTC facility. In 1980, during a routine site inspection, the BCEQCB discovered that the HSTC was contaminating groundwater by disposing of process wastes into an injection well.	1977 - 1980
The BCEQCB requested assistance from EPA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The HTSC subsequently filed for Chapter 11 Bankruptcy Status in November 1981.	1981
The EPA conducted a Site Assessment and developed a Remedial Action Master Plan (RAMP)	1982
The Site was listed final on the National Priorities List (NPL). The HTSC conducted several preliminary studies to further characterize the site, and then initiated scaled-down remedial investigation activities.	1983
The EPA subsequently conducted the feasibility study and issued a Record of Decision	1986
The final remedial design (RD) was completed in May 1988, and was implemented during the period from December 1989 through June 1993.	1988 - 1993
Long-term response actions were completed with the demobilization of the groundwater treatment system.	1994
An initial Five-Year Review assessment was completed.	1/1996
CDM Federal Programs conducted a Geoprobe investigation to further characterize a suspected source area located on the south side of Plant #1.	6/1999
The second Five-Year Review assessment was completed and cited the results from the 1999 Geoprobe study for its recommendation that additional soil remediation was required to meet the goals of the ROD	4/2000

Site Chronology (continued)

Event	Date
Final supplemental remedial investigation report issued. This report concluded that, while EPA had previously remediated what was at the time recognized as the most highly contaminated area, the East Drainfield, groundwater and soil characterizations indicated the presence of additional residual sources. These sources were the South Drainfield and the West Drainfield, with its septic tank. While past remediation had significantly decreased the groundwater contamination, the goals of the ROD would not be achieved if these contaminated soils in the South and West Drainfield were not more thoroughly addressed. Additionally, the Supplemental Remedial Investigation Report concluded that there was evidence that redox conditions existed which are conductive for biodegradation of the chlorinated organic contaminants.	6/2001
An Explanation of Significant Differences (ESD) was issued by EPA, with concurrence from the Florida Department of Environmental Protection. This ESD specified that, in order to meet and maintain groundwater cleanup goals permitting the eventual removal of the HSTC Site from the National Priorities List, residual subsurface sources of volatile organic compounds (VOCs) needed to be removed.	10/2001
Remediation of the South and West Drainfield commenced through excavation and removal of the contaminated soil. Excavation was performed as deep as possible, but the full extent of the contaminated soil was not able to be removed.	2/2002
The Remedial Action Report was completed.	9/2002
Shaw Environmental, Inc. developed an in-situ bioremediation pilot test for the areas of the South and West Drainfields, associated with Plant #1 of the HSTC Site. The Pilot Test Work Plan, Former Hollingsworth Solderless Terminal Site, was completed on December 2004.	6/2003
A bioremediation pilot test was conducted by Shaw Environmental, Inc.	4-6/2005

III. Background

Physical Characteristics

The Hollingsworth Site is located at 700 NW 57^{th} Place in the City of Fort Lauderdale, Broward County, Florida. The site consists of approximately 3.5 acres and is occupied by two buildings separated by NW 57^{th} Place. The Site is bounded by asphalt and dirt alleyways and a mixture of commercial and light industrial properties. The southern building at the site, formerly known as Plant #1, is presently occupied by a number of small businesses. The northern building at the site, formerly known as Plant #2, was occupied by Kabinet Co. A general location map is presented on Figure 1. A map of the approximate locations of the monitoring wells found during the document review for this third Five-Year Review is shown on Figure 2. A map of the monitoring wells found during the field reconnaissance for this Five-Year Review is shown on Figure 3. The site is located within the 100 year flood plain and is topographically flat.

Land and Resource Use

Hydrogeology

The City of Fort Lauderdale's primary water supply, the Prospect Well Field, is located approximately two miles west of the site. The wells closest to the HSTC Site are located within a quarter to a half mile. The Prospect Well Field taps into the Biscayne aquifer for water supply. This aquifer, which also underlies the Site, is highly permeable, unconfined, and is composed of limestone and sandstone. In the vicinity of the Site, the top of the aquifer is near ground surface, and its base is approximately 200 to 250 feet below ground surface. The upper 60 to 70 feet of the aquifer are primarily composed of fine-to-medium grained sands. These sands, in turn, are underlain by a transition zone of cemented shell and sandstone, and finally by the limestone layer which forms the major water producing zone of the Biscayne aquifer. Underlying the Biscayne aquifer is a relatively impermeable sequence of clay and marl of the Hawthorn Formation, approximately 400 feet thick. The Hawthorn Formation serves as a confining unit between the Biscayne aquifer and the brackish water of the underlying Floridan aquifer. The regional direction of groundwater flow is to the southeast.

Surface Water

The Atlantic Ocean is located approximately five miles to the east of the site, and the Everglades lie approximately 10 miles to the west. Cypress Creek Canal is located approximately one and a half miles to the north and the Middle River Canal two miles to the south. The average rainfall for this area is approximately 60 inches per year. The site is located within the 100 year flood plain and is topographically flat.

History of Contamination

From 1968 until 1982, the Hollingsworth Solderless Terminal Company (HSTC) manufactured solderless electrical terminals, consisting of a conductive metal portion and a plastic sleeve. The manufacturing process included heat treatment in molten salt baths, degreasing, and electroplating. For approximately eight years, the company disposed of wash water and process wastewater contaminated with trichloroethene (TCE) and heavy metals into drain fields and an injection well located onsite, resulting in contamination of soil and groundwater.

Initial Response

Enforcement and Compliance

Initial investigations regarding environmental issues began in 1977 when the Broward County Environmental Quality Control Board (BCEQCB) began investigating the disposal practices of the HSTC facility. In 1980, during a routine site inspection, the BCEQCB discovered that the HSTC was contaminating groundwater by disposing of process wastes into an injection well. Subsequently, in June of 1981, the BCEQCB requested assistance from EPA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The HTSC subsequently filed for Chapter 11 Bankruptcy Status in November 1981.

Site History

The EPA conducted a Site Assessment and developed a Remedial Action Master Plan in 1982. The Site was listed as final on the National Priorities List in 1983. The HTSC conducted several preliminary studies to further characterize the site, and then initiated scaled-down remedial investigation activities in 1983. The EPA subsequently conducted the feasibility study and issued a ROD in 1986. Additional sampling was conducted by the EPA in February 1987, which led to an effort to excavate and treat contaminated source soil. Due to heavy rain and high water levels, the soil removal effort was abandoned. The final RD was completed in May 1988 and was implemented during the period from December 1989 through June 1993. Long term response actions were completed in November 1994 with the demobilization of the groundwater treatment system, as ordered by EPA, with concurrence from the State of Florida.

Basis for Taking Action

Contaminants

Hazardous substances that have been released at the site in each media include:

Soil		**Groundwater**	
Target Contaminant	**Cleanup Goal**	**Target Contaminant**	**Cleanup Goal**
Copper	10.0 mg/L	Vinyl Chloride	1.0 ug/L
Nickel	1.0 mg/L	Trans-1,2-Dichloroethene	70.0 ug/L
Lead	0.5 mg/L	Trichloroethene	3.2 ug/L
Total VOCs	1.0 mg/kg		

The primary contaminants of concern associated with potential health risks which were identified in the ROD (1986) are as follows: vinyl chloride, TCE, trans 1,2-dichloroethene (t-1,2 DCE), and to a lesser extent, nickel, tin, and copper.

Six additional contaminants were detected in 1987, which were not considered contaminants of concern with respect to health risks, but which cleanup goals were established for during the remedial design. These contaminants are: 1,1-dichloroethane; 1,2- dichloroethane; 1,1 –dichloroethene; cis-1,2-dichloroethene; tetrachloroethene; and 1,1,2-trichloroethane. Metals were not detected above the ROD performance standards during the 1987 investigation, and therefore were not considered as contaminants of concern in the final remedial design.

The criteria for determining if the groundwater is clean were if the concentrations of these contaminants in the treated effluent were below the cleanup goals. Cleanup goals for groundwater remediation were developed based on the 10^{-6} cancer risk, the state of Florida primary drinking water standards, and proposed MCLs. The cleanup goal for soil was established at 1 mg/kg for TCE and/or 1 mg/kg for total VOCs.

Based on the results of the public health evaluation reported in the ROD, there are no complete pathways for exposure by direct contact, ingestion, or inhalation of contaminants from the Hollingsworth Site.

However, there is a probable pathway associated with direct contact with soil if any future excavation is conducted. There is also a potential for future exposure via installation of private irrigation wells or industrial supply wells down-gradient of the site. No known installation of private irrigation wells or industrial supply wells down-gradient has occurred since the signing of the ROD in 1986, as of the time of completion of this Five-Year Review report.

Lifetime Cancer Risk factors associated with exposure to potentially carcinogenic chemicals in groundwater were calculated and reported in the ROD for vinyl chloride and TCE. There is no cancer slope factor for trans-1,2-DCE. At present, the cancer risk for vinyl chloride associated with ingestion of groundwater (hypothetical future scenario) exceeds the 10^{-4} threshold and is considered unacceptable.

IV. Remedial Actions

Remedy Selection

The objectives of remedial action, as stated in the 1986 ROD, are to prevent further migration of contaminated groundwater into the Biscayne aquifer by cleaning up existing contamination in the aquifer and to remove the sources of contamination from overlying soils and drainfields. Since groundwater contamination at the site is the primary concern, determining the extent of contamination and establishing a target zone for soil and groundwater remediation was key to accomplishing remedial objectives. Soil remediation was to focus on removal of volatile contaminants in the East Drainfield, the only source of contamination believed to require treatment at that time.

The Selected Remedy, as stated in the ROD, includes the following components:

- Proper abandonment of the old injection well and all other PVC wells on site;
- Treatment of VOC contaminated soil on site;
- Treatment of VOC contaminated groundwater on site; and
- Injection of treated groundwater near the site.

This remedy was selected because it was determined that it could meet the cleanup goals and the objectives of the remedial response for the lowest cost , using proven technology.

An initial Five-Year Review assessment was completed in January 1996. Periodic groundwater monitoring has continued up to the present. In June 1999, CDM Federal Programs conducted a Geoprobe investigation to further characterize a suspected source area located on the south side of Plant #1. The second Five-Year Review assessment was completed in April 2000 and cited the results from this 1999 Geoprobe study for its recommendation that additional soil remediation was required to meet the goals of the ROD. Additionally, the second Five-Year Review recommended that the remedy for groundwater contamination be re-evaluated due to the continued presence of high levels of contamination in monitoring wells B, C, and D; which are all located on the southern side of Plant #1.

As a result of the preceding, EPA conducted a supplemental remedial investigation. The final report was finalized in June 2001. This report concluded that, while EPA had previously remediated what was at the time recognized as the most highly contaminated area, the East Drainfield, these remedial actions resulted in reduced contamination in this area, however, groundwater and soil characterizations indicated the presence of additional residual sources. These sources were the South Drainfield and the West Drainfield, with its septic tank. During rising groundwater events, the groundwater would come in contact with this contaminated soil, thus causing the detection of contaminants in monitoring wells B, C and D. While past remediation had significantly decreased the groundwater contamination around the Hollingsworth Site, the goals of the ROD would not be achieved if these contaminated soils in the South and West Drainfield were not more thoroughly addressed. Additionally, the Supplemental Remedial Investigation Report concluded that there was evidence that redox conditions exist which are conductive for biodegradation of the chlorinated organic contaminants.

In response to these findings, an Explanation of Significant Differences (ESD) was issued in October of 2001 by EPA, with the concurrence of the Florida Department of Environmental Protection. This ESD specified that, in order to meet and maintain groundwater cleanup goals permitting the eventual removal of the HSTC Site from the National Priorities List, residual subsurface sources of volatile organic compounds (VOCs) needed to be removed. In February 2002 remediation of the South and West Drainfield commenced through excavation and removal of the contaminated soil in these areas. Excavation was performed as deep as possible (approximately 8 to 9 feet bgs), given that the fine-to-medium grain sands began flowing at this depth. Due to the flowing sands at this depth, the full extent of the contaminated soil could not be removed.

Sampling of a subset of groundwater monitoring wells following the soil removal showed that, although the shallow (20 ft bgs) met the ROD's goals, the intermediate depth wells (50 ft bgs) did not (see Table 1). As a consequence, through the U.S. Army Corps of Engineers, Shaw Environmental, Inc., was subcontracted to develop remedial options, which included in-situ chemical oxidation and enhanced bioremediation. Following review of both these options by EPA and FDEP, Shaw Environmental, Inc., was tasked to develop an in-situ bioremediation pilot test for the areas of the South and West Drainfields, associated with Plant #1 of the HSTC Site. The Pilot Test Work Plan, Former Hollingsworth Solderless Terminal Site, was completed on December 2004. This bioremediation pilot test was conducted from April though June 2005.

Remedy Implementation

Soil Remediation

During the remedial design phase in 1987, additional field studies were undertaken to supplement and verify available site data. In February 1987, the EPA Emergency Response Contractor (ERC) attempted to excavate and remediate contaminated soil from the East Drainfield area, as part of an interim removal action. The plan was to excavate the East Drainfield to a depth of four feet, aerate the removed soil with a backhoe; and replace treated soil into the excavation. This attempt proved unsuccessful due to a high water table and unseasonably heavy rain. Strong odors were observed from the groundwater in the excavation, and it was decided that it would be of little use to treat and replace soil back into the excavation, where it would again be re-contaminated due to contact with contaminated groundwater. Soil excavation and treatment efforts were subsequently abandoned. The difficulties encountered by the EPA-ERC provided the EPA with enough information to develop a more effective design for remediating contaminated soil. The remediation technology selected was a soil vacuum extraction (SVE) system.

Based on the selected remedial action, which by then included a revised plan for soil remediation, Camp Dresser and McKee, Inc., (CDM) prepared and submitted a revised Remedial Design Report in February 1988. Soil remediation was to be accomplished prior to groundwater remediation, so that contaminated soils would not continue to impact groundwater during remediation.

In 1989, Westinghouse Remediation Services, Inc., designed and installed the SVE system in a 14' x 12' area of the East Drainfield, which was put into operation in January 1991. The SVE system treated soils in the unsaturated zone. Soil samples collected in July 1991 (to a depth of 12 feet bgs) from the East Drainfield area provided verification that the soil vapor removal system had reduced TCE concentrations below the cleanup goal of one part per million (ppm). The SVE system was subsequently dismantled in March 1992. A subsequent review of the ROD revealed that total VOC concentrations were to be remediated to concentrations less than one ppm, not just TCE. Additional soil samples were collected in March 1993 (to a depth of five feet bgs) verified that the soil vapor extraction system had also remediated total VOC concentrations below the cleanup goal of one ppm in the unsaturated zone.

Per recommendations made in the 1999 second Five-Year Review, soil in the West and South Drainfields were removed. The recommendation made was to excavate these areas. This was completed in February 2002. On the basis of the results of the TCLP analyses performed on the excavated soils, 182 tons of soils were removed to a non-hazardous landfill at the Central Sanitary Landfill & Recycling Center in Pompano Beach, FL. Forty four tons of Portland cement-stabilized sludge were found to be hazardous as a results of the TCLP testing, as it failed testing for TCE. Following an evaluation of competitive bids, this cement-stabilized sludge was shipped to the Chemical Waste Management, Inc. facility in Emelle, AL. Subsequent to this and in order to meet the ROD's groundwater remediation goals, an in-situ enhanced bioremediation pilot test was initiated in April and continued through June 2005. Results of this pilot test are not yet available and cannot be reviewed for this third Five-Year Review.

Groundwater Remediation

Construction of the groundwater treatment system was completed by December 1991. The system was comprised of three wells capable of extracting 150 gallons per minute (gpm) each, an air-stripping tower capable of 450 gpm of flow, and two injection wells into which treated effluent was injected into the Biscayne aquifer. The system startup and shakedown was completed on July 17, 1992. Effluent samples collected on August 16, 1994 indicated that the treatment system discharge was not meeting the permit requirements. It was determined that the failure was due to fouling of the packing material in the air stripper. The treatment system was shut down on August 17, 1994. In November 1994, the groundwater treatment system was removed from the site, as ordered by the U.S. EPA with concurrence from the State of Florida.

The groundwater treatment system was designed based on an estimated removal and treatment of approximately 180 million gallons of water. During its period of operation, the groundwater treatment system averaged flow rates between 280 and 350 gpm. The influent concentrations of the contaminants of concern, measured as total VOC concentrations, were reduced from 12,500 ug/L (7/15/92) to 480 ug/L (10/27/92). Groundwater samples collected from Y-series and Z-series wells indicated that contaminant levels were consistently below the required cleanup levels. However, groundwater samples collected from monitoring wells installed near the East Drainfield and in the portion of the aquifer suspected to be most contaminated showed contaminant levels consistently above the required cleanup levels during this time period. The groundwater treatment system was shut down and removed prior to the accomplishment of the remediation objectives for groundwater. In order to meet the ROD's groundwater remediation goals, an in situ enhanced bioremediation pilot test was initiated in April 2005 through June 2005. Results of this pilot test are not yet available and can not be reviewed for this third Five-Year Review

System Operation/Operation and Maintenance

The operational period of the groundwater remediation system was July 1992 through August 1994. The treatment system was removed from the site in November 1994. An in-situ enhanced bioremediation pilot test operated from April 2005 through June of 2005. Therefore, aside from periodic sampling of the monitoring wells, there are no ongoing operation and maintenance activities associated with groundwater remediation.

Based on interview with Galo Jackson, EPA Region IV Remedial Project Manager, there is no ongoing operation and maintenance activity at the Hollingsworth Site, except for minor upkeep of existing monitoring wells.

V. Progress Since Last Five-Year Review

The SVE system, the original remedy for soil remediation, had reduced TCE and total VOC concentrations in the unsaturated zone of the East Drainfield below the cleanup goal of 1 ppm by July 1991. Of the six suspected source areas, the East Drainfield was originally considered to be the worst contaminated. The second Five-Year Review cited the June 1999 Geoprobe investigation as evidence of additional soil contamination along the south and west sides of Plant #1. This confirmed suspicions that this area was a primary source area of soil contamination. Also, a Geoprobe boring placed near the East Drainfield area revealed contamination levels in excess of cleanup goals. This may indicate that soil in or around the East Drainfield area has likely become recontaminated through exposure to contaminated groundwater. The objective for soil remediation as stated in the ROD was to remove the sources of contamination from overlying soils and Drainfields. Based on the existing levels of widespread soil contamination along the south side of Plant #1 and contamination at or near the East Drainfield, it was concluded in the second Five-Year Review that the remedy was incomplete and only partially effective. To address this issue, soil in the West and South Drainfields was excavated in 2002 to a depth of approximately eight feet bgs. This, however, did not remove all of the contaminants, as pools of black oils were visible at the base of the excavation. Therefore, it can be concluded that the excavation was also only partially effective as well. The excavation performed in 2002 could not reach below 8 to 9 feet due to the flowing sands encountered. Additionally, the flowing sands from this 8 foot deep excavation caused the Plant #1 building's cinder block exterior wall to be damaged. This damage was repaired by EPA. In April through June 2005, an in-situ enhanced bioremediation pilot test was initiated to cleanup the remaining contaminants that could not be removed through excavations. The results of this effort are not yet available and its effectiveness can not be reviewed in this third Five-Year Review.

Although the groundwater treatment system had significantly reduced influent target contaminant concentrations at the site by 1992, the groundwater treatment system was shut down and removed in November 1994, prior to the accomplishment of the remediation objectives for groundwater. Results from sampling of a subset of the monitoring wells in August 2002, five and a half months after the removal of the contents of the West and South drainfields, indicated that, although contaminant concentrations in the shallow (20 ft) monitoring wells had declined significantly, contaminant concentrations in the intermediate (50 ft) monitoring wells in the vicinity of the South Drainfield did not show a similar decline

One of the remedial objectives, as stated in the ROD, was to properly abandon the injection well used by HSTC in the 1970's. In May 1993, Ebasco Environmental attempted to locate the injection well, but was unsuccessful. During the first Five-Year Review conducted by Roy F. Weston, Inc., in 1996, it was noted that the injection well still existed on the west side of Plant #1, and that apparently it had not been abandoned. It was also noted in Weston's 1996 report that the well could be acting as a conduit for cross contamination between zones. During the site inspection for the second Five-Year Review, June 1999, this injection well could not be located. Records searched during the 1999 second Five-Year Review found no mention of the well being properly abandoned. The second Five-Year Review recommended that this well be found through a geophysical survey and properly abandoned. While an excavator was available during the 2002 removal of the septic tank and South Drainfield, it was used to find the injection well. It was located and photographed. Since then, the well has been covered over, presumably by the building owners. Based on available documentation, it is still unknown whether or not the old injection well has been properly abandoned.

VI. Five-Year Review Process

Administrative Components

The Science and Ecosystem Support Division and the Waste Management Division of US EPA Region 4 established the review schedule whose components included:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection;
- Local Interviews; and
- Five-Year Review Report Development and Review.

Community Involvement

Activities designed to involve the community in this Five Year Review included interviews with the tenants occupying Plant 1 and 2, as well as interviews with neighboring businesses. A notice of the start of this Five Year Review was sent to the main local newspaper, the Sun-Sentinel. This notice was run on July 25, 2005.

Document Review

This Five-Year review consisted of a review of relevant documents including O&M records and monitoring data. Applicable soil and groundwater cleanup standards, as listed in the 1986 Record of Decision, were reviewed (see Attachments 1 and 2).

Data Review

Pre-ROD Investigations

The Broward County Environmental Quality Control Board (BCEQCB) began investigating the disposal practices of the HSTC as early as 1977, which culminated with the 1980 discovery that hazardous waste was being disposed into an injection well.

In 1981, field investigation activities began, and a Remedial Action Master Plan (RAMP) was developed by Ecology and Environment, Inc. (E&E). The RAMP included specific recommendations, costs, and timetables for cleaning up the Hollingsworth Site under CERCLA procedures. During the same time period, several other investigations were conducted by HSTC consultants.

A summary of the activities and results of all field investigations and studies conducted prior to the signing of the ROD in 1986 is as follows: installation and sampling of 20 on-site wells in 1981/1982 including monitoring wells A, B, C, D, E, 2, 5, 6, 7, 8, PN5, PN9, PS5, PS9, 2A, 2B; installation of two Biscayne aquifer wells in 1983 (TW-1, MW-1); installation of 9 permanent off-site monitoring wells in 1985 (3S, 3I, 3D, 7S, 7I, 7D, 8S, 8I, 8D); collection and analysis of 41 surface and subsurface soil samples for metals and 13 subsurface soil samples for VOCs; and installation of 10 shallow temporary observation wells for water table measurement, and contaminant transport modeling. The second Five-Year Review stated that monitoring wells D1 and D2 existed in the HSTC groundwater monitoring network for a total number of 20 monitoring wells. These wells were not found during this third Five-Year Review. Monitoring well locations are shown on Figure 2. Limited well abandonment has taken place over the history of the HSTC Site. For example, monitoring wells YD, XI, and A were previously abandoned.

Analysis of groundwater samples obtained from on-site wells during this time period revealed elevated concentrations of TCE (1981, 1982, 1985), 1,2 DCE (1981, 1982, 1985), and vinyl chloride (1985 only), with the highest concentrations occurring at the 50 and 75 feet below ground surface depths. Analysis of groundwater samples obtained from off-site monitoring wells (1985) revealed contamination in one up-gradient well, but no contamination in down-gradient wells. Based on interpretation of results, it was believed that by 1986, contaminants had migrated only a short distance, mostly vertical, and were being retarded at a depth of 50-to-70 feet below land surface (bls). Worst-case scenarios of contaminant transport modeling (1984) showed that the HSTC site could not be a source of contamination to any nearby City of Ft. Lauderdale well fields.

Six areas of documented or suspected soil contamination were studied: the West Drainfield area (Plant #1); East Drainfield area (Plant #1); South Drainfield area (Plant #1); French storm drain area (south of Plant #1); surface discharge area between buildings (Plant #2); and the surface discharge area in field north of site. With the exception of the East Drainfield, sampling results indicated that levels of VOCs were generally low, though sampling of the South Drainfield soil was limited to the upper 12 feet and detection limits were one part per million (ppm). It should be noted that a headspace measurements taken from one of the soil samples gave a reading of 10 ppm. Some soil samples contained elevated concentrations of copper, tin, nickel, or lead, but metal contamination of soil was not considered to be an environmental or public health threat.

Post-ROD Investigations

During the remedial design phase in 1987, additional field studies were undertaken to supplement and verify available site data. Nine additional monitoring wells XS, XI, XD, YS, YI, YD, ZS, ZI, and ZD (see Figure 2), were installed and sampled (along with samples from some existing wells) for VOC's, to define design parameters for the selected remedial alternative. Slug tests were also performed on these nine wells.

Limited groundwater and soil samples were also collected during the soil removal activities conducted by EPA in February 1987. In general, results indicated lower concentrations of VOC's in groundwater than in previous investigations, and also that contamination had shifted down-gradient. Contaminants found in the highest concentrations in groundwater were 1,2-DCE and vinyl chloride, primarily in the 25 to 68 foot range. Soil contamination at concentrations exceeding the cleanup criteria was believed to be limited to the East Drainfield. TCE was the only contaminant detected in soil from a sample obtained from the East Drainfield, at a concentration of 17 ppm. In retrospect, too much reliance was put on the limited pre-ROD data, which had elevated detection limits and was non-specific, i.e., samples were analyzed for oil and grease, not for the specific site-related VOC contaminants.

Soil samples collected in July 1991 from the East Drainfield area provided verification that the SVE system installed by Westinghouse Remediation Services had reduced TCE concentrations to less that one ppm. After further review of soil remediation goals, additional soil samples collected from the East Drainfield area in March 1993 provided verification that the SVE system had also reduced total VOC concentrations below the remediation goal of one ppm. Confirmatory soil sampling did not extend below the water table.

After the groundwater treatment system went on-line in July 1992, groundwater monitoring samples were collected on a monthly basis beginning in July 1992 and continuing through April 1993, as part of the Phase 1 monitoring plan. Samples taken included: influent, effluent, Y-series wells, Z series wells, and 2 C/D wells. Groundwater samples obtained from the Y-series wells (those installed on the east side of the plume), consistently had contaminant levels below detection limits during this time period. Groundwater samples collected from the Z-series wells (those installed up-gradient of the southern-most extraction well), showed that contaminant levels had dropped below the required cleanup levels by January 1993. Groundwater samples collected from monitoring wells installed near the East Drainfield and in the portion of the aquifer suspected to be most contaminated showed contaminant levels consistently above the required cleanup levels during this time period, but also showed a decreasing trend.

In order to track the operational status of the groundwater treatment system, groundwater samples were also obtained on a monthly basis from monitoring wells ZD, ZI, C, and D during the period from July 1992 through September 1994. In November 1994, the groundwater treatment system was shut down and demobilized, as ordered by the U.S. EPA with concurrence from the State of Florida. During this time period, contaminant concentrations exceeded the cleanup criteria for each of the contaminants of concern at one or more of these wells.

U.S. EPA's Science & Ecosystem Support Division collected groundwater samples from wells 7, 7S, 7I, 2A, XS, XI, A, 8, B, C, D, 3S, 3I, ZS, ZI, YS, YI, PN-5, and PS-5 on the following dates: June 1995, May 1996, January 1997, May 1997, and August 1998. Based on the results, TCE was found to be below detection limits in each of the wells for each sampling event. Vinyl chloride was present in wells B, C, D, XI, PN-5, 3D, 3I above the 1.0 ug/L cleanup criteria. The highest concentrations of vinyl chloride were 1,700 ug/L (8/98, well B), and 230 ug/L (8/98, well C). Cis-1,2 DCE was present in wells B, C, and D in concentrations exceeding the cleanup criteria of 70 ug/L. The highest concentrations were 9,700 ug/L (6/95, well D), 1,100 ug/L (8/98, Well B), and 5,100 ug/L (8/98, well C).

Due to persistent groundwater contamination levels in excess of cleanup criteria, in June 1999, EPA had CDM Federal Programs, Inc. conducted a Geoprobe investigation to further characterize a suspected source area and gather data for supplemental remedial design. The focus of this study was to characterize an area approximately 185 feet by 35 feet on the south side of former Plant #1. This area had not been sufficiently investigated in previous studies, and was suspected by EPA to be one of the primary source areas for persistent contamination. The results reported were found to be orders of magnitude higher than those found previously. In addition, contaminants which previously had never been detected were reported. The laboratory never acknowledged an error. Re-sampling became necessary.

In order to correct the preceding, an additional Geoprobe soil and groundwater sampling investigation was conducted during September 2000. This study also collected biogeochemical parameters to characterize the biological degradation capabilities of the site. Soils obtained from DPT location GP-16, location is just south of the South Drainfield, found vinyl chloride (170 ug/kg), cis-DCE (820E ug/kg), and TCE (1,400 ug/kg) at a depth of 10 ft. These compounds were not detected in the 5 ft and 20 ft intervals. Soil obtained from DPT location GP-26, located adjacent to the building in the immediate vicinity of the South Drainfield, was found to have concentrations of vinyl chloride throughout the 5, 10, and 20 ft sampling intervals in excess of cleanup goals, with total VOC concentrations being 324 ug/kg, 585 ug/kg, and 19 ug/kg, respectively. Additionally, groundwater concentrations at GW-26 were found to have vinyl chloride at 1000E ug/L at the 4ft interval and 6 ug/L at the 24 ft interval. GW-30, just south of GW-26, encountered vinyl chloride (1,700 ug/L) and cis-DCE (3,645 ug/L). Groundwater redox conditions were found to be conducive to the anaerobic dechlorination of the groundwater contaminants.

Based on the results from the supplemental remedial investigation, soil removal was implemented early in 2002, which consisted of excavation of contaminated soils in the South and West Drainfields. During remediation of the South Drainfield, which was subdivided with sheet piling for the purpose of excavation, a black liquid was observed at the base of the excavation of one of the sheet pile columns. Total depth of this column was about 8 to 9 feet bgs (or 3 to 4 feet below the water table). At the base of the column #3, brown oily soil was observed. Contaminants found in the soils from these excavations were found to increase with depth (Tables 2 thorough 4). Table 5 presents the soil data for row C of the excavation. Concentrations for all three target cleanup parameters increase with depth. This is especially true for column #5 of the excavation. Column #4 was incorporated into column #5 after the 2 ft interval due to the flowing sands encountered during the excavation and as such is not represented in the data in Table 5.

After as much soil as could be remediated through the excavation was completed, a large-scale bioremediation pilot test was deployed from April through June of 2005. As a part of this pilot test, performance groundwater wells were installed to determine the baseline conditions that existed for both the contaminants of concern and also of the naturally occurring bioremediation potential of the subsurface soils. Four of eight of these performance wells found TCE, cis-1,2-DCE, and vinyl chloride above the target cleanup goals. These data are presented on Table 6.

Vertical Extent of Contaminant Plume

Based on data available at the time of the remedial design (1987/1988), it was believed that contaminant migration was primarily vertical, and was significantly being retarded at a depth of 50 to 70 feet bgs, in a transition zone from sand to sandstone and cemented shell. Any contamination that passed through this zone into the high permeability production zone was believed to be rapidly diluted and transported offsite. This was substantiated by groundwater samples obtained by Enviropact from TW-1, MW-1 and east cluster wells in January 1984, which revealed the heaviest contamination above the 50 foot depth, decreasing concentrations at greater depths, and non-detects or low concentrations at depths of 200 feet or greater.

Analysis of groundwater monitoring data collected from 1995 to 1998 indicates that high levels of contamination were detected at the 20 and 50 foot depths, primarily at wells located near or at the source areas (wells C, B, D), and that much lower levels of contamination were detected at the 100 foot depth. The highest levels of contamination at the shallow and intermediate depths were detected at well D (total VOCs: 11,731 ppb, Jun-95); well C (total VOCs: 5,330 ppb, Aug-98); and well B (total VOCs: 2,970 ppb, Aug-98). The highest levels of contamination at the 100 foot depth were detected at well E (total VOCs: 63.63 ppb, May-96); well 3D (total VOCs: 36.13 ppb, Jun-95); and well 5 (total VOCs: 34.64 ppb, May-96). Contaminant levels at the 100 foot depth showed a significant decreasing trend subsequent to the June 1996 sampling event. At the time of the August 1998 sampling event, contaminant levels at the 100 foot depth at all deep wells were non-detect or negligible, with the exception of well 3D (total VOCs: 31 ppb). Groundwater sampling at monitoring well 3D in August of 2002 found that the contaminate levels were remaining essentially unchanged from 1998. Based on this analysis, it appears that the vertical extent of contamination is fairly well defined, and that vertical migration of contamination continues to be significantly retarded in the zone between 50 feet bgs and 100 feet bgs.

Horizontal Extent of Contaminant Plume

The remedial design was based on a target zone of groundwater contamination. The primary area of contamination was defined within a 200 foot radius centering around wells 2, C, D, and E. The maximum extent of contamination (down-gradient) was defined within a 200 foot radius centering on a point approximately 75 feet south of well cluster Z, although the southern boundary of the plume had not been definitively established at that time. During the period of groundwater monitoring from 1995 to 1998, the four target contaminants were not detected in well cluster Z at the shallow depth (20 feet bgs) and at the intermediate depth (50 feet bgs). At the deepest level (100 foot bgs), no contamination has been detected since the June 1995 sampling event (total VOC's: 3.33 ppb, Jun-95). Based on this data, it appears that the southern edge of the contaminant plume does not extend beyond well cluster Z (downgradient), as of August 1998. No data past August 1998 has been found for review for this third Five-Year Review for well cluster Z. Based on consistent non-detections at the shallow and intermediate depths and several exceedences of cleanup goals at the 100' depth at well cluster 3, it appears that the western edge of the plume does not extend beyond well cluster 3 in the upper sand zone, but that the western fringe of the plume may be present at the 100 foot depth. This is evident by essentially unchanged concentrations at monitoring well 3D from 1995 through 2002. It is also possible that an off-site source may be contributing to deep contamination at well 3D. Based on consistent non-detections or negligible concentrations at all three depths at wells X and 7 (upgradient), it appears that the northern edge of the plume does not extend beyond these wells. In conclusion, it appears that the target zone for groundwater contamination developed during the remedial design phase is still representative of the maximum horizontal extent of contamination, with the possible exception that the western fringe of the plume may be present at the 100 foot depth at well 3D.

Site Inspection

The Five-Year Review site inspection for the Hollingsworth Site was held on February 28, 2005. The site inspection was conducted by Doug Jager, USEPA, Region 4, SESD. During the site inspection, Mr. Ken Magaro was interviewed, and a walk through of the site was conducted. The walk-through was limited to the outside property of Plant #1 and both inside and outside of Plant #2. Photographs showing current site conditions are presented on Figure 4 through 9.

The SVE system was removed from the site in March 1992. The groundwater remediation system was removed in November 1994. The bioremediation system was not deployed until April 2005, two months after this Site Inspection, therefore, there was little to inspect at the site except for the existing monitoring wells. Most of the monitoring wells appeared functional. Caps and locks were observed on most monitoring wells. Some cover plates on flush mounted wellheads were not bolted down. A monitoring well located to the east of Plant #2 (probably the 7 series wells) was observed to not have its wellhead properly locked (see Figure 8). Monitoring wells at the HSTC Site were not clearly marked and labeled. Also, because the wellheads are flush mounts, some dirt and debris were collecting on the wellheads. Some of these flush mounted wellheads were not constructed in a manner as to be able to repel surface water runoff from the parking lots (see Figure 7). Figure 9 shows a monitoring well located on the southeast corner of the Plant #2 property lot. This wellhead was found to be damaged and no longer capped. The periphery of the Plant #1 was paved with asphalt or concrete, except for a grass area on the north side of the building. The north side of Plant #1 can be seen on Figure 4.

The Site Inspection Checklist is presented in Attachment 3.

Interviews

Mr. Galo Jackson, EPA Region IV Remedial Protect Manager

Mr. Jackson was interviewed by phone on several occasions. Mr. Jackson provided background information on the Hollingsworth Site, documentation, and information on ongoing site activities. Mr. Jackson provided documentation which was reviewed for this report. Much of what was learned from Mr. Jackson is included in this report.

Joanne Trivitz, President / CEO, New River Cabinet & Fixture, Inc

The presence of the HSTC Site has been a problem. Although it has added to the cost of acquiring the two neighboring properties, the site also reduced the price of the purchased properties. It has been Ms. Trivitz's experience that commercial lenders will not make loans, once a negative Phase 1 has been encountered. Financing must be found through the Small Business Administrations or other alternative lenders. The terms of these loans are less attractive than commercial loans. Although the New River Cabinet Property, Inc. is in the process of being upgraded, the HSTC Site remains an eyesore. During construction of the bioaugmentation system, the vehicles and equipment compounded the already existing traffic congestion. There was one incident at the site involving a potential break-in. EPA is not keeping the neighbors informed at all. The two main recommendations are to finish the clean-up and to make the building look better.

Ken Magaro, U.S. Automated Mail, Inc

Mr. Magaro is in the process of purchasing Plant #2. Mr. Magaro mentioned some concerns regarding the property immediately north of Plant #2. He has learned that it was the property was owned by U.S. Steel and is concerned that some of the contamination detected by the HSTC Site may be attributable to the former U.S. Steel operations. His impression of the bioaugmentation system is that it is sophisticated and that the individuals involved in its construction are professional. The biggest concern is that any real estate purchases in the immediate vicinity of the HSTC Site require a Phase 1 and Phase 2, increasing the purchaser's costs. All lenders, except the sophisticated ones tend to decline loans, due to the presence of the HSTC Site. The main recommendation is to definitely get it off the books.

Catherine Shorter, Central Sign Systems, Inc.

All the individuals involved have been courteous and efficient. She reads every update posted on the Web. Shaw, Inc. has done an excellent job. At one point a leak occurred in one of the potassium lactate injection lines. This was cleaned-up right away. Other than experiencing severe headaches during excavation of the South Drainfield, no other adverse impacts have been noted.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents, ARARs, risk assumptions, and the results of the site inspection indicates that the remedy is functioning as intended by the ROD, as modified by the ESD. The excavation and capping of contaminated soils is making progress toward achieving the remedial objectives to minimize the migration of contaminants to groundwater and prevent direct contact with, or ingestion of, contaminants in soil. The results from bioremediation pilot test, which has recently been implemented, are not yet available and cannot be reviewed for this third Five-Year Review. One of the elements of the selected remedy was to properly abandon the old injection well at the HSTC Site. To date, this well has not been properly abandoned. The old injection well has been covered over with fill, so it is no longer a risk through indiscriminate dumping of wastes. The casing of the well is of unknown quality, however, and could be acting as a conduit for contamination to move between different zones.

Operation and Maintenance (O&M) of the monitoring well network needs to start incorporating more inspection and maintenance and repairs of these wells. Some wells heads were found during the site inspection to be unlocked, missing bolts to the wellhead, and in one case even damaged to the point of being open /uncapped and at risk to indiscriminate dumping of wastes. The site is located within the 100 year flood plain and is topographically flat. As such, heavy rains or floods present a risk to the wellheads if they are not more periodically inspected and maintained. The damaged well (see Figure 9) needs to be properly abandoned or repaired. Additional resources may be freed for the O&M program for these activities by locating low value monitoring wells and abandoning them.

There is some concern that the plume may be migrating downgradient toward MW-3D (west of Plant #1). Vinyl Chloride concentrations at this location have remained basically unchanged since 1995 and are above the ROD's cleanup goals in the deep well of this cluster. Additional groundwater samples may be warranted further west of the MW-3 cluster to further delineate this plume. Additionally, more groundwater sampling may be required just south of Plant #1 to further evaluate the effectiveness of the bioremediation remedy.

As a result of the HSTC Site being designated a delineated area, pursuant to Chapter 62-524 of the Florida Administrative Code, an institutional control in the form of restrictions on the installation of new potable water wells is in place. Figure 10 shows the extent of the area delineated, pursuant to Rule 62-524.430. Rules 62-524-550, 62-524.600, 62-524-650 and 62-524.700 impose restrictions on well construction, water quality testing, and permitting of groundwater well located in delineated areas.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considered

Since the soil remedial work has been completed, most ARARs for soil contamination cited in the ROD have been met. ARARs that still must be met at this time and that have been evaluated include: the Safe Drinking Water Act (SDWA) (40 CFR 141) from which many of the groundwater cleanup levels were derived - [Maximum Contaminant Levels (MCLs), and MCL Goals (MCLGs)]. A list of ARARs is included in Attachment 2 . The cleanup goals for the HSTC Site, as stated in the ROD, are more protective than EPA's MCL's. The ROD's cleanup goal for vinyl chloride is set at 1.0 ug/L which is reflective of the State of Florida's SDWA. The ROD's cleanup goal for TCE is set at 3.2 ug/L, which is between the EPA MCL and the State MCL. What was found of note in this review of the ARARs for the HSTC Site is that both the EPA MCL and the State MCL for trans-1,2-DCE are 100ug/L. The ROD's cleanup goal for trans-1,2-DCE is set at 70ug/L, more conservative and protective than either the State or federal MCLs. The RODs cleanup goal for trans-1,2-DCE should be re-evaluated.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included both current exposures (older child trespasser, adult trespasser) and potential future exposures (young and older future child resident, future adult resident and future adult worker). There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. These assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No change to these assumptions or the cleanup levels developed from them is warranted. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing and it is expected that all groundwater cleanup levels will be met.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No ecological targets were identified during the baseline risk assessment and none were identified during the five-year review, and therefore monitoring of ecological targets is not necessary. There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedy is functioning as intended by the ROD, as modified by the ESD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. ARARs for soil contamination due to metals as cited in the ROD have been met. ARARs for soil contamination due to VOCs as cited in the ROD have been met within the first few feet (~8 feet) of soil and are capped with either concrete or asphalt. Groundwater contamination due to VOC has been reduced, but still remains an issue. A bioremediation pilot test has been implemented to attempt to remediate the remaining contaminants. The ROD's cleanup goal for trans-1,2-DCE is set at 70ug/L, more conservative and protective than either the State or federal MCLs. The RODs cleanup goal for trans-1,2-DCE should be reevaluated. More inspection, maintenance, and repair needs to be incorporated into the O&M for the monitoring wells at this site. Monitoring wells have been found unsecured and damaged. Some monitoring wells need to be abandoned. There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
A) One of the elements of the selected remedy, as stated in the ROD, was to properly abandon the injection well used by HSTC in the 1970's. In May 1993, Ebasco Environmental attempted to locate the injection well, but was unsuccessful. During the first Five-Year Review conducted by Roy F. Weston, Inc. in 1996, it was noted that the injection well still existed on the west side of Plant #1, and that apparently it had not been abandoned. It was also noted in Weston's 1996 report that the well could be acting as a conduit for cross contamination between zones. During the site inspection for the second Five-Year Review, June 1999, this injection well could not be located. Records researched during the 1999 second Five-Year Review found no mention of the well being properly abandoned. The second Five-Year Review recommended that this well be found through a geophysical survey and properly abandoned. While an excavator was available during the septic tank and drainfield removal, it was used to find the injection well. The injection well was located and photographed. Since then, the well has been covered over, presumably by the building owners. Based on available documentation, it is still unknown whether or not the old injection well has been properly abandoned.	Y	Y
B) The remedial objective for groundwater remediation has not yet been accomplished.	N	Y
C) Groundwater monitoring wells are scattered throughout the parking areas and since they are flush mount they have accumulated dirt and oil around the well head. More routine maintenance of these wellheads is necessary as stated in the first Five-Year Review Report. Also, some flush mounted wellheads were observed without bolts locking down the cover plate (see Attachment 8). Improperly secured wells could act as a conduit for contamination from the surface to the groundwater.	N	Y
D) Groundwater monitoring wells are not clearly marked.	N	N
E) Most monitoring wells appeared to be properly secured and locked, however, a monitoring well located west of Plant #2 was found unlocked and appeared to have been left un-attended for some time (see Figure 3 for location and Figure 10 for photograph). This monitoring well appears to be the 7-series. However, due to the wells not being clearly marked this identification can not be certain.	N	Y

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
<u>F)</u> A monitoring well located at the southeast corner of the property of Plant #2 was found to have a damaged wellhead (see Figure 3 for location and Figure 9 for photograph). This well may possibly be monitoring well XD. However, due to the wells not being clearly marked this identification can not be certain. This monitoring well appears to have been run over by a heavy vehicle or possibly damaged by a large yawn mower. Due to the well being unlocked and not capped, this well could be acting as a conduit for contamination from the surface to the groundwater. Additionally, like the old injection well cited in Weston's 1996 first Five-Year Review report, this well could also be acting as a conduit for cross contamination between zones due to the integrity of the well casing being in question. This well is located at UTM Zone 17, Northing 2,897,813, Easting 584,716, NAD 1927.	Y	Y
<u>G)</u> During the document review for this third Five-Year Review, no citation was ever directed toward the existence of a Quality Assurance Project Plan (QAPP) or associated Data Quality Objectives (DQO)'s for the HSTC Site. EPA order 5360.1 requires that a QAPP be completed and approved before environmental samples are collected or measurements performed.	N	Y
<u>H)</u> Abandonment of monitoring wells has occurred in the past. If low value monitoring wells are found and abandoned, resources could be freed for items like the routine inspection and maintenance of the remaining groundwater monitoring network.	N	Y

IX. Recommendations and Follow-Up Actions

Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Mile-Stone Date	Affects Protectiveness? (Y/N)	
					Current	Future
A) Abandon old injection well	Provide notification and obtain any necessary permits from South Florida Water Management District and/or Broward County Department of Natural Resource Protection, and properly abandon the old injection well. This recommendation to abandon the old injection well has been made in the previous two Five-Year Reviews.	EPA		12/31/2006	Y	Y
B) Groundwater remediation objective not complete	Recommend that the bioremediation treatability study for groundwater contamination continue to be monitored to assess trends in remediation results. Recommend leaving the bioremediation system in place until groundwater remediation has been accomplished.	EPA		9/30/2009	N	Y
C) Groundwater monitoring wells need additional O&M (see Figures 8 and 9).	Recommend more routine inspection and maintenance of the wellheads at the HSTC Site. Some wellheads have been constructed in a manner that will allow surface water runoff from the parking lot and roads in this industrial area to pool over the wellheads, i.e., the wellheads are not mounded to repel surface water. If these wellheads are not properly secured with bolts and gaskets then this is a potential source for contamination from the surface to the groundwater.	EPA		06/30/2006	N	Y

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Mile-Stone Date	Affects Protectiveness? (Y/N)	
					Current	Future
D) Groundwater monitoring wells are not clearly marked.	Recommend clearly labeling wellheads with identifying markings for the groundwater monitoring network at the HSTC Site.	EPA		06/30/2006	N	N
E) Monitoring well found unlocked and appeared to have been left un-attended for some time (see Figure 3 for location and Figure 10 for photograph)	Recommend properly securing a monitoring well located to the west of Plant 2, probably one of the 7 series cluster. The monitoring well is located at UTM Zone 17, Northing 2,897,849, Easting 584,611, NAD 1927. Increase inspection and maintenance in the (O&M) program for this HSTC Site.	EPA		06/30/2006	N	Y
F) Damaged wellhead.	Recommend properly abandoning a monitoring well located at the southeast corner of Plant #2's lot. The wellhead for this monitoring well has had its stainless steel casing sheared off and is now un-secured and un-capped. Due to the well casing being torqued/bent over, the integrity of the well casing is in question. Until properly abandoned, this well is a potential for both contamination from the surface to the groundwater via indiscriminate dumping of wastes down the un-capped well; and also by cross contamination between zones due to the well casing being in question. This well is located at UTM Zone 17, Northing 2,897,813, Easting 584,716, NAD 1927.	EPA		06/30/2006	Y	Y

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Mile-Stone Date	Affects Protectiveness? (Y/N)	
					Current	Future
G) Quality Assurance Project Plan (QAPP) and associated Data Quality Objectives (DQO)'s.	EPA order 5360.1 requires that a QAPP be completed and approved before environmental samples are collected or measurements performed. A QAPP and associated DQOs should be developed for the HSTC Site.	EPA		9/30/2007	N	Y
H) Assessment to find and abandon "low value" monitoring wells in the groundwater monitoring network	In conjunction with developing DQO's for the HSTC Site, recommend that an assessment be performed on which monitoring wells are needed for the continued assessment of the bioremediation remedy and which monitoring wells may be eligible to be abandoned. Abandonment of monitoring wells has occurred in the past. However, there still exists a plethora of monitoring wells in the groundwater monitoring network for the HSTC Site. It may be found from the assessment that most or all of the wells are needed. However, if low value monitoring wells are found and abandoned, resources could be freed for items like the routine inspection and maintenance of the remaining groundwater monitoring network.	EPA		9/30/2007	N	Y

X. Protectiveness Statement

The remedial actions at the HSTC Site have not been completely effective in accomplishing the remedial objectives. The remedy implemented at the HSTC Site is protective in the short term. Contaminants are still present in the groundwater. No known industrial or private wells exist within the known plume of contamination around the HSTC Site. The issues noted during this review do not appear to be immediate threats to the protectiveness human health and the environment. However, future excavations or the installation of additional wells around the HSTC Site could cause a threat to the protectiveness of human health and the environment. The old injection well is still not properly abandoned, as required by the ROD. The old injection well has been buried, but not properly abandoned. As such, it is no longer an immediate threat via indiscriminate dumping of wastes; but the well could be acting as a conduit for cross contamination between zones. An in-situ bioremediation pilot test was developed and implemented for the areas of the South and West Drainfields, associated with Plant #1 of the HSTC Site. This bioremediation pilot test was conducted from April though June 2005. The effectiveness of this remedy could not be evaluated in this third Five-Year review as the data is not currently available.

The most immediate threat to the protectiveness of the HSTC Site are monitoring wells not being properly secured or wells being damaged. More inspection and maintenance of the groundwater monitoring well network needs to be incorporated into an O&M program. Low value monitoring wells need to be properly abandoned, and the old injection well needs to be properly abandoned.

Long-term protectiveness of the remedial action should be verified by obtaining additional groundwater sample locations to fully evaluate potential migration of the contaminant plume down gradient (west and south) from Plant #1. These additional sample locations will also be vital in evaluating the effectiveness of the bioremediation remedy. Current data indicates that the excavation and removal of the contaminated soils in the South and West drainfields during February 2002 has significantly reduced groundwater contaminants. However, visible contaminants remained at the 8 ft bgs depths after excavations were completed. As a consequence, Shaw Environmental, Inc., was tasked to develop an in-situ bioremediation pilot test for the areas of the South and West Drainfields, associated with Plant #1 of the HSTC Site. This bioremediation pilot test was conducted from April though June 2005. The bioremediation will need to continue to be monitored to judge the effectiveness of long term protection offered by this remedy.

XI. Next Review

The Hollingsworth Site requires a policy-type review every five years, until the cleanup goals are achieved. The fourth five-year review report is due to be approved within five years of the date of the signature of this report.

TABLES

TABLE 1 - Hollingsworth Solderless Terminal NPL Site

Ft. Lauderdale, Broward County, FL

August 2002 Data

Contaminant	FL Groundwater Criteria	Ntl. Atten. Default Criteria	MW-3D		MW-B	MW-C	MW-D		MW-2
total depth, feet below ground surface:			95.8		22.5	50.04	24.9		75.37
(M- AND/OR P-)XYLENE	10,000	100,000	0.64	J	ND	ND	ND		ND
1,1,1-TRICHLOROETHANE	200	2,000	18		ND	ND	ND		ND
1,1-DICHLOROETHANE	70	700	17		ND	ND	ND		ND
1,1-DICHLOROETHENE	7	700	6.1		ND	ND	ND		ND
CHLOROBENZENE	100	1,000	1.4		ND	ND	ND		ND
CHLOROETHANE	140	-	3.4		ND	ND	ND		ND
CIS-1,2-DICHLOROETHENE	70	700	1.8		ND	9,400	ND		530
TOLUENE	1,000	10,000	0.58	J	ND	ND	0.99	J	ND
TRANS-1,2-DICHLOROETHENE	100	1,000	ND		ND	310	ND		48
TRICHLOROETHENE	3	300	ND		ND	260	ND		ND
TRICHLOROFLUOROMETHANE	2100	21,000	0.53	J	ND	ND	ND		ND
VINYL CHLORIDE	1	100	14		ND	3,400	ND		200

Data Qualifiers

U-Material was analyzed for but not detected.

J-Estimated value

concentrations are in parts per billion

ND-not detected

Table 2: Soil Sample Screening Results (2 ft)								
Parameter	Target Cleanup Level (ug/kg)	Column						Row
		1	2	3	4	5	6	
Vinyl Choride	7	0	-	-	-	-	-	C
DCE	400	-	-	-	-	-	-	
TCE	30	-	8.5	2	-	-	-	
Vinyl Choride	7	-	-	-	-	-	-	B
DCE	400	-	-	-	-	-	-	
TCE	30	-	-	-	**37**	-	-	
Vinyl Choride	7	-	-	-	-	-	-	A
DCE	400	-	-	-	-	-	-	
TCE	30	-	-	-	3	-	-	
Results are in ug/kg, dry weight basis								
Values are Estimated								
Note: "-" = Below Reporting Limit; ~ =Value above the Calibration range, estimated								
Table Reproduced from Remedial Action Report September 2002								

Table 3: Soil Sample Screening Results (4 ft)								
Parameter	Target Cleanup Level (ug/kg)	Column						Row
		1	2	3	4	5	6	
Vinyl Choride	7	-	-	-		-	-	C
DCE	400	-	-	-		28	-	
TCE	30	-	-	11		16	1.26	
Vinyl Choride	7	-	-	-		-	-	B
DCE	400	-	-	-		-	-	
TCE	30	-	17	25		-	3.3	
Vinyl Choride	7	-	-	-		-	-	A
DCE	400	-	-	-		-	-	
TCE	30	-	-	-		-	1.93	
Results are in ug/kg, dry weight basis Values are Estimated Note: "-" = Below Reporting Limit; ~ =Value above the Calibration range, estimated Table Reproduced from Remedial Action Report September 2002								

Table 4: Soil Sample Screening Results (6 ft)								
Parameter	**Target Cleanup Level (ug/kg)**	**Column**						**Row**
		1	**2**	**3**	**4**	**5**	**6**	
Vinyl Choride	7	-	-	-		>300	-	
DCE	400	-	-	19		>800	-	**C**
TCE	30	-	-	-		>2	-	
Vinyl Choride	7	**~52**	-	**~80**		32	-	
DCE	400	~58	-	-		13	-	**B**
TCE	30	-	-	-		-	-	
Vinyl Choride	7	-	-	**~100**		-	-	
DCE	400	-	-	**~300**		-	-	**A**
TCE	30	-	-	-		-	1.93	
Results are in ug/kg, dry weight basis Values are Estimated Note: "-" = Below Reporting Limit; ~ =Value above the Calibration range, estimated Table Reproduced from Remedial Action Report September 2002								

Table 5: Soil Sample Screening Results of Row C (with Depth)								
Parameter	**Target Cleanup Level (ug/kg)**	**Grids of Row C**						**Depth**
		C1	**C2**	**C3**		**C5**	**C6**	
Vinyl Choride	7	0	-	-		-	-	
DCE	400	-	-	-		-	-	**2 ft**
TCE	30	-	8.5	2		-	-	
Vinyl Choride	7	-	-	-		-	-	
DCE	400	-	-	-		28	-	**4 ft**
TCE	30	-	-	11		16	1.26	
Vinyl Choride	7	-	-	-		>300	-	
DCE	400	-	-	19		>800	-	**6 ft**
TCE	30	-	-	-		>2	-	
Results are in ug/kg, dry weight basis Values are Estimated Note: "-" = Below Reporting Limit; ~ =Value above the Calibration range, estimated Table Reproduced from Remedial Action Report September 2002								

Table 6: Highlighted Performance Monitoring Results (ug/L)											
Parameter	**Performane Monitoring Wells**										MCL/Unit
	1	2	3	4	5	6	7	8	MW-B	MW-D	
TCE	-	**3.6**	-	-	-	-	-	**13**	-	-	<3 ug/L
cis-1,2-DCE	-	-	**120**	**150**	-	-	-	**1700**	-	-	<70 ug/L
Vinyl Chloride	-	-	**10**	**6.8**	-	-	-	**13**	0.1	-	<1 ug/L
Ethane	130	1.4	NS	NS	22	NS	NS	46	6.1	0.14	ug/L
Ethene	2.6	4	NS	NS	0.8	NS	NS	85	0.37	0.11	ug/L
Methane	9.4	0.04	NS	NS	4.1	NS	NS	1.9	0.72	1.5	ug/L
TOC	120	5	79	58	37	23	15	16	7	6	mg/L
Fe^{+2}	3.2		1.6	3.9	6.2	7.1	3.2	1.2	0.07	-	0.3 mg/L
NO_3	-	-	-	-	-	-	-	-	-	-	1.0 mg/L
SO_4	8	15	2.5	7.9	38	9.1	7.2	3	11	-	250 mg/L
S	13	0.6	6.5	6.5	1.7	4.5	1.9	0.8	7.6	0.55	mg/L
DHC (10^X Power)	3	1	3	3	5	2	2	5	NS	NS	cells/ml
pH	5.8	6.8	5.8	5.7	6.4	6.1	6	6.5	5.9	7	6.5-8.5
Fatty Acids	-	-	-	-	-	29	32	-	-	-	mg/L

Note: "-" = Less than detection limit; NS= Not Sampled
Table Obtained from Vital Signs Report V1.0 of Bioremediation Results found by SHAW Environmental

FIGURES

Figure 1: Hollingsworth Solderless (General Locations)

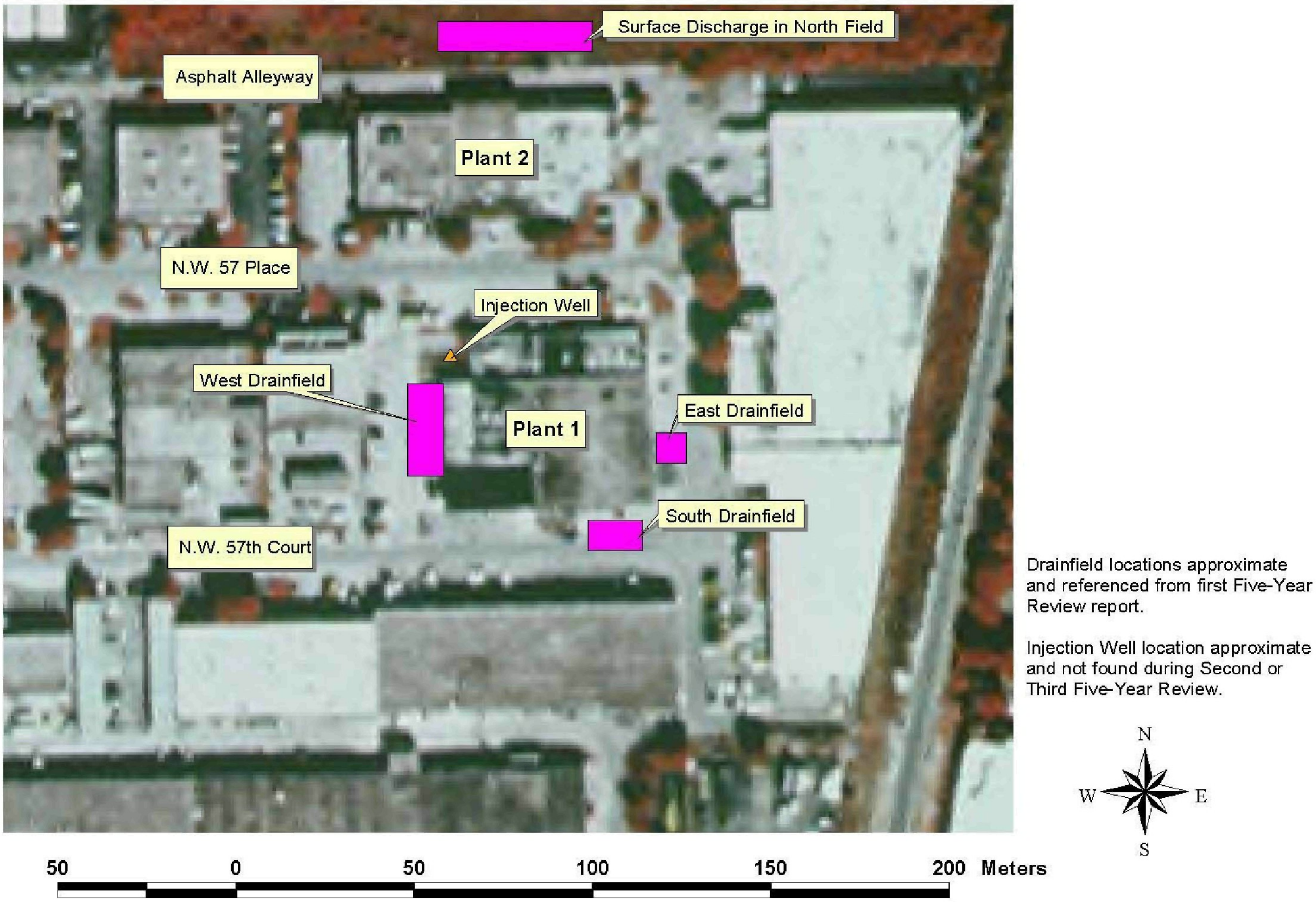
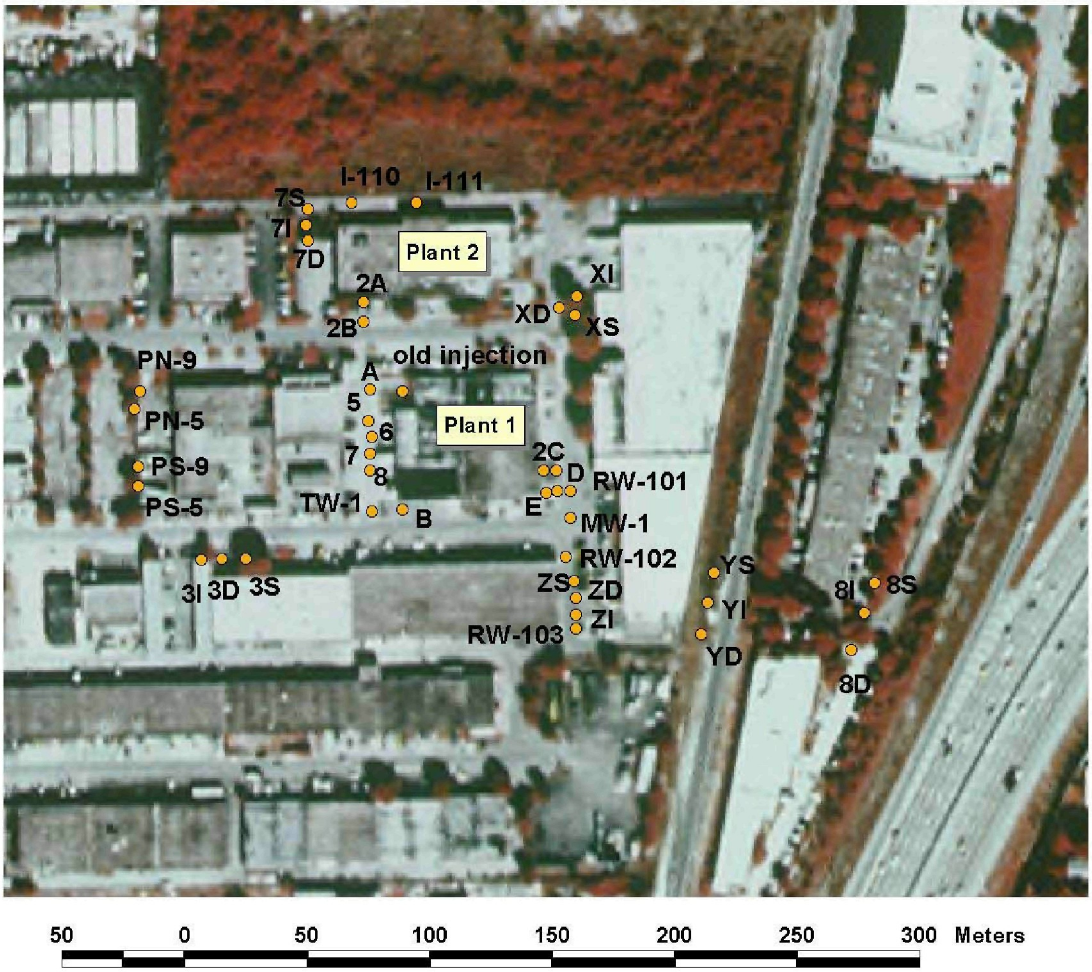


Figure 2: HSTC Historic Groundwater Monitoring



Groundwater monitoring locations approximate. Locations derived through inspection of Site Layout Map found in First Five-Year Review report.

Injection Well location approximate and not found during Second or Third Five-Year Review.

Figure 3: HSTC
(Monitoring wells observed during Site Inspection)

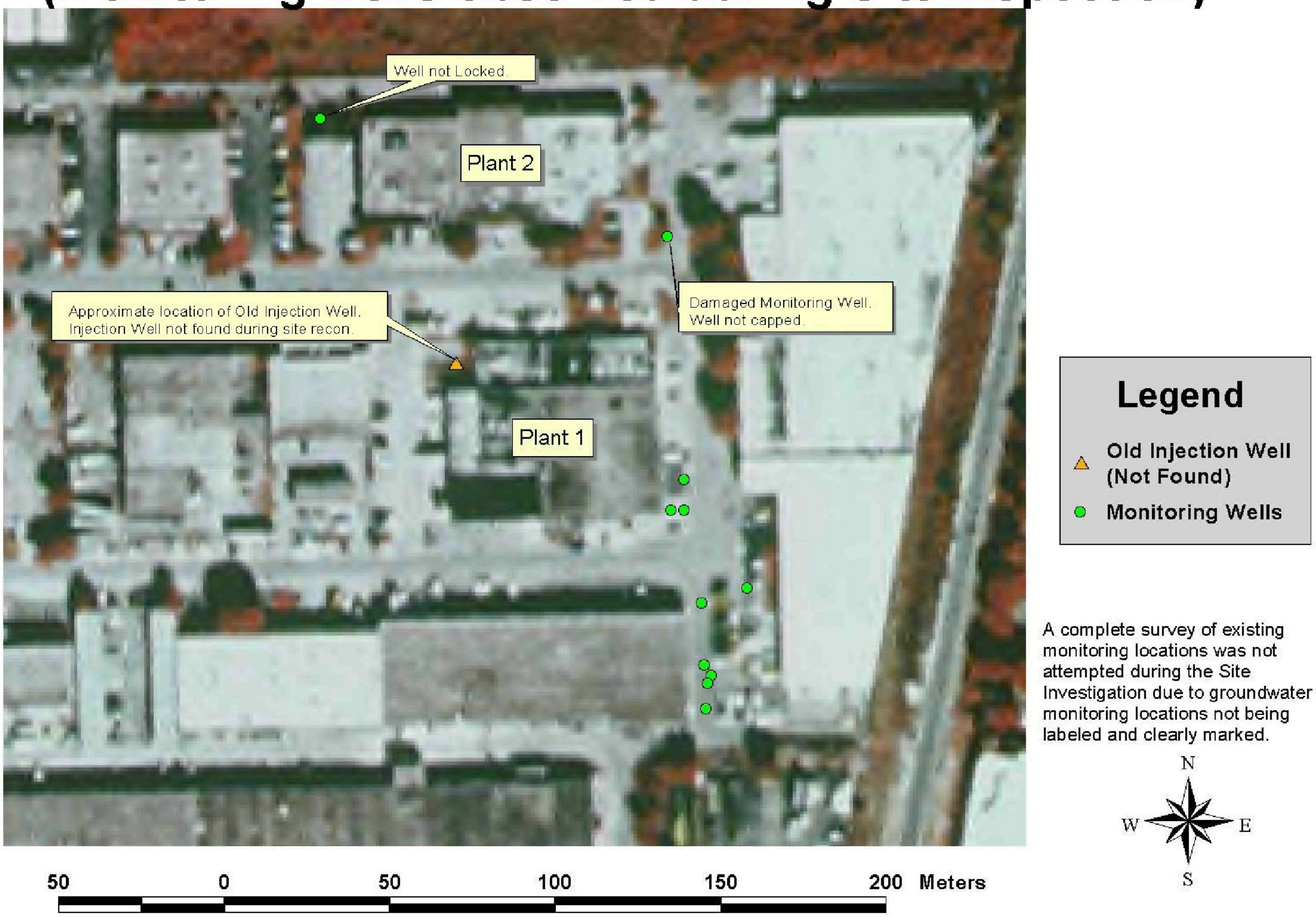
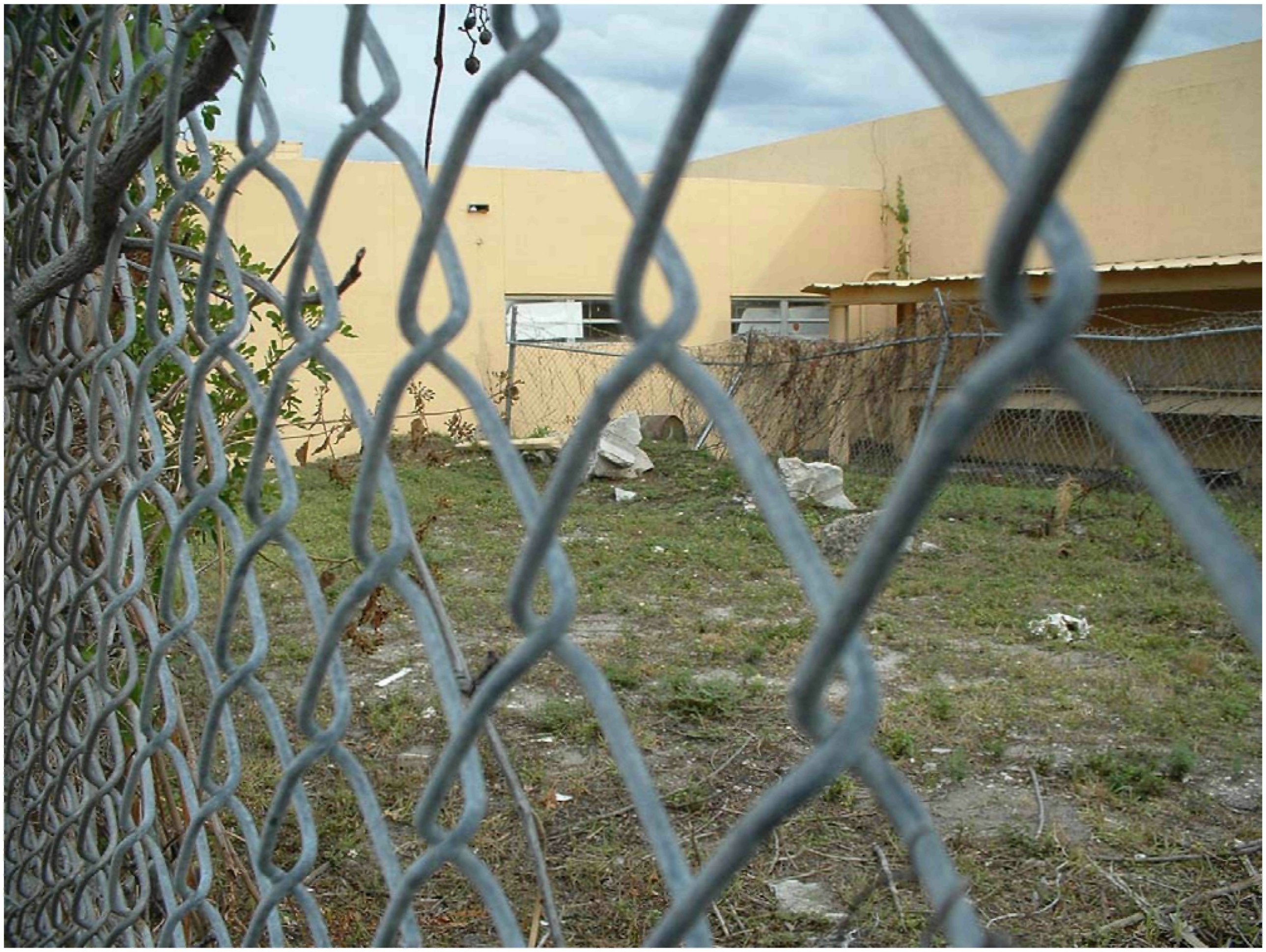


FIGURE 4

FIGURE 5



View is to the southeast; northwest corner of Plant #1. This is the reported location of the "Old Injection Well", not seen here. No records were found indicating that the well had been previously abandoned, as also found in the 1999 Second Five-Year Review.

FIGURE 6

Monitoring well found in good shape. However, the well is not clearly labeled and the cover plate for the wellhead is not bolted down.

FIGURE 7

Monitoring well cluster, flush mount. Wellheads are covered with dirt and debris. Wells are not clearly labeled. Wellheads should have been constructed to be mounded so that surface water runoff from the parking lots would not collect over the well heads.

FIGURE 8

Monitoring well located in a fenced area to the west of Plant #2. Well head is not locked, however the well is capped. Location of well suggests that it is probably one of the 7 series wells, however, the well is not clearly labeled. Coordinates for this well are:
UTM Zone 17, Northing 2,897,849, Easting 584,611, NAD 1927.

FIGURE 9

Monitoring well located on the southeast corner of Plant #2 property lot. Well appears to have been damaged by a large vehicle or perhaps a large yawn mower. Damaged wellhead is cut/bent off and is not capped or locked. Integrity of stainless steel well casing below the ground surface is in question. Well should be properly abandoned. Coordinates for this well are:
UTM Zone 17, Northing 2,897,813, Easting 584,716, NAD 1927.

FIGURE 10: Delineated Area

ATTACHMENT 1

List of Documents Reviewed

1. Record of Decision, April 1986
2. Final Remedial Action Report, May 1993
3. First Five-Year Review Final Report, January 1996
4. Second Five-Year Review Final Report, April 2000
5. Final Supplemental Remedial Investigation Report, June 2001
6. Explanation of Significant Differences, October 2001
7. Remedial Action Report, September 2002
8. Letter, Transmittal of August 2002 Analytical Data,
   from Galo Jackson, USEPA to Marvin Collins, FL-DEP, October 2002
9. Draft Pilot Test Workplan by SHAW Environmental, December 2004
10. Pilot Test Vital Signs Report, by SHAW Environmental, April 8-29, 2005

ATTACHMENT 2

Applicable or Relevant and Appropriate Requirements (ARARs)

Medium/ Authority	ARAR	Status	Requirement Synopsis	Action to be taken to Attain ARAR
Groundwater/ SDWA	Federal - SDWA - Maximum Contaminant Levels (MCLs) (40 CFR Part 141)	Relevant and Appropriate	Standards (MCLs) have been adopted as enforceable standards for public drinking water systems: goals.	Bioremediation of contaminated material in soils and groundwater will eliminate contaminants in the groundwater. MCLs will be attained in groundwater.
Groundwater/ SDWA	Florida State Drinking Water Standard - F.A.C.62-520 and 62-550	Relevant and Appropriate	Maximum contaminant levels are established for organic chemical contaminants under F.A.C.62-520 and 62-550.	The selected remedy will attain State MCLs for organics in the groundwater, with the possible exception of Trichloroethene. The Cleanup Goal in the ROD is set at 3.2 ug/L, which is more stringent than Federal MCLs, but is slightly more relaxed than the state MCL of 3 ug/L.

ATTACHMENT 3

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Hollingsworth Solderless Terminal Co.	**Date of inspection:** 2 / 28 / 2005
Location and Region:	**EPA ID:** FLD004119681
Agency, office, or company leading the five-year review: US EPA, Region 4, SESD	**Weather/temperature:** Overcast

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other: Abandonment of old injection well (which has not yet been completed). SVE system was originally deployed to treat contaminated soils. After the ESD, the West and South Drainfields were excavated. An in situ bioremediation pilot test has been initiated.
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☒ Site map attached (See Attachment 1)

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** ______________________ ______________________ ______________
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ______________
   Problems, suggestions; ☐ Report attached ____
   ____

2. **O&M staff** ______________________ ______________________ ______________
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ______________
   Problems, suggestions; ☐ Report attached ____
   ____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency ____________________
Contact ____________________ ____________ ______ ________
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ________________________________
____

Agency ____________________
Contact ____________________ ____________ ______ ________
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ________________________________
____

Agency ____________________
Contact ____________________ ____________ ______ ________
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ________________________________
____

Agency ____________________
Contact ____________________ ____________ ______ ________
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ________________________________
____

4. **Other interviews** (optional) ☒

(See Section "VI. Five-Year Review Process", subsection "Interviews", for interview with Ken Magaro).

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	**O&M Documents**			
	☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
	☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
	☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: Site Inspection did not include review of O&M Documents as no operations were being conducted during this Site Inspection.			
2.	**Site-Specific Health and Safety Plan**	☐ Readily available	☐ Up to date	☒ N/A
	☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up to date	☒ N/A
	Remarks______________________________			
3.	**O&M and OSHA Training Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks______________________________			
4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits____________________	☐ Readily available	☐ Up to date	☒ N/A
	Remarks______________________________			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks______________________________			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks______________________________			
7.	**Groundwater Monitoring Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks______________________________			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks______________________________			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks______________________________			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks______________________________			

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other______________________________

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate____________ ☐ Breakdown attached

Total annual cost by year for review period if available

From__________ Date	To__________ Date	__________ Total cost	☐ Breakdown attached
From__________ Date	To__________ Date	__________ Total cost	☐ Breakdown attached
From__________ Date	To__________ Date	__________ Total cost	☐ Breakdown attached
From__________ Date	To__________ Date	__________ Total cost	☐ Breakdown attached
From__________ Date	To__________ Date	__________ Total cost	☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: ______________________________

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
Remarks______________________________

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks______________________________

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) ______________________
Frequency ______________________
Responsible party/agency ______________________
Contact ______________ ______________ ______ ______
Name Title Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ☐ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: Fencing is in good repair. Areas that are accessible to the public are paved.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks______________________

2. **Land use changes on site** ☒ N/A

Remarks______________________

3. **Land use changes off site** ☒ N/A

Remarks______________________

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks______________________

B. Other Site Conditions

Remarks ____
____
____
____
____
____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent______________ Depth____________
Remarks____
____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths____________ Widths___________ Depths__________
Remarks____
____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent______________ Depth____________
Remarks____
____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent______________ Depth____________
Remarks____
____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks____
____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks____
____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent______________ Height____________
Remarks____
____

8. **Wet Areas/Water Damage**	☐ Wet areas/water damage not evident		
☐ Wet areas	☐ Location shown on site map	Areal extent______________	
☐ Ponding	☐ Location shown on site map	Areal extent______________	
☐ Seeps	☐ Location shown on site map	Areal extent______________	
☐ Soft subgrade	☐ Location shown on site map	Areal extent______________	
Remarks_____________________________________			
9. **Slope Instability** ☐ Slides	☐ Location shown on site map	☐ No evidence of slope instability	
Areal extent______________			
Remarks_____________________________________			
B. Benches ☐ Applicable ☐ N/A			
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1. **Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay	
Remarks_____________________________________			
2. **Bench Breached**	☐ Location shown on site map	☐ N/A or okay	
Remarks_____________________________________			
3. **Bench Overtopped**	☐ Location shown on site map	☐ N/A or okay	
Remarks_____________________________________			
C. Letdown Channels ☐ Applicable ☐ N/A			
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1. **Settlement**	☐ Location shown on site map	☐ No evidence of settlement	
Areal extent______________	Depth____________		
Remarks_____________________________________			
2. **Material Degradation**	☐ Location shown on site map	☐ No evidence of degradation	
Material type_______________	Areal extent_____________		
Remarks_____________________________________			
3. **Erosion**	☐ Location shown on site map	☐ No evidence of erosion	
Areal extent______________	Depth____________		
Remarks_____________________________________			

4.	**Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting Areal extent______________ Depth____________ Remarks____
5.	**Obstructions** Type____________________ ☐ No obstructions ☐ Location shown on site map Areal extent______________ Size____________ Remarks____
6.	**Excessive Vegetative Growth** Type____________________ ☐ No evidence of excessive growth ☐ Vegetation in channels does not obstruct flow ☐ Location shown on site map Areal extent______________ Remarks____
D. Cover Penetrations ☐ Applicable ☐ N/A	
1.	**Gas Vents** ☐ Active ☐ Passive ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks____
2.	**Gas Monitoring Probes** ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks____
3.	**Monitoring Wells** (within surface area of landfill) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks____
4.	**Leachate Extraction Wells** ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks____
5.	**Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A Remarks____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A	
1.	**Gas Treatment Facilities** ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse ☐ Good condition ☐ Needs Maintenance Remarks____
2.	**Gas Collection Wells, Manifolds and Piping** ☐ Good condition ☐ Needs Maintenance Remarks____
3.	**Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings) ☐ Good condition ☐ Needs Maintenance ☐ N/A Remarks____
F. Cover Drainage Layer ☐ Applicable ☐ N/A	
1.	**Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks____
2.	**Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks____
G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A	
1.	**Siltation** Areal extent______________ Depth____________ ☐ N/A ☐ Siltation not evident Remarks____
2.	**Erosion** Areal extent______________ Depth____________ ☐ Erosion not evident Remarks____
3.	**Outlet Works** ☐ Functioning ☐ N/A Remarks____
4.	**Dam** ☐ Functioning ☐ N/A Remarks____

H. Retaining Walls	☐ Applicable	☐ N/A	
1.	**Deformations** Horizontal displacement____________ Rotational displacement____________ Remarks____	☐ Location shown on site map Vertical displacement_______________	☐ Deformation not evident
2.	**Degradation** Remarks____	☐ Location shown on site map	☐ Degradation not evident
I. Perimeter Ditches/Off-Site Discharge		☐ Applicable	☐ N/A
1.	**Siltation** ☐ Location shown on site map ☐ Siltation not evident Areal extent______________ Depth____________ Remarks____		
2.	**Vegetative Growth** ☐ Vegetation does not impede flow Areal extent______________ Type____________ Remarks____	☐ Location shown on site map	☐ N/A
3.	**Erosion** Areal extent______________ Depth____________ Remarks____	☐ Location shown on site map	☐ Erosion not evident
4.	**Discharge Structure** Remarks____	☐ Functioning ☐ N/A	
VIII. VERTICAL BARRIER WALLS		☐ Applicable	☒ N/A
1.	**Settlement** Areal extent______________ Depth____________ Remarks____	☐ Location shown on site map	☐ Settlement not evident
2.	**Performance Monitoring** Type of monitoring__________________________ ☐ Performance not monitored Frequency________________________________ ☐ Evidence of breaching Head differential__________________________ Remarks____		

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A
1. **Pumps, Wellhead Plumbing, and Electrical** ☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A Remarks______________________________
2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks______________________________
3. **Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks______________________________
B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A
1. **Collection Structures, Pumps, and Electrical** ☐ Good condition ☐ Needs Maintenance Remarks______________________________
2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks______________________________
3. **Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks______________________________

C. Treatment System ☒ Applicable ☐ N/A	
1.	**Treatment Train** (Check components that apply) ☐ Metals removal ☐ Oil/water separation ☒ Bioremediation ☒ Air stripping ☐ Carbon adsorbers ☐ Filters______________________ ☐ Additive (*e.g.*, chelation agent, flocculent)______________________ ☐ Others______________________ ☐ Good condition ☐ Needs Maintenance ☐ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☐ Equipment properly identified ☐ Quantity of groundwater treated annually______________________ ☐ Quantity of surface water treated annually______________________ Remarks: The pump and treat system was removed in 1994. The bioremediation remedy was not in operation at the time of this site inspection.
2.	**Electrical Enclosures and Panels** (properly rated and functional) ☒ N/A ☐ Good condition ☐ Needs Maintenance Remarks______________________
3.	**Tanks, Vaults, Storage Vessels** ☒ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance Remarks______________________
4.	**Discharge Structure and Appurtenances** ☒ N/A ☐ Good condition ☐ Needs Maintenance Remarks______________________
5.	**Treatment Building(s)** ☒ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair ☐ Chemicals and equipment properly stored Remarks______________________
6.	**Monitoring Wells** (pump and treatment remedy) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ All required wells located ☒ Needs Maintenance ☐ N/A Remarks: Monitoring wells need more inspection. Wells found unsecured and damaged. Wells not clearly marked and labeled.
D. Monitoring Data	
1.	Monitoring Data ☐ Is routinely submitted on time ☐ Is of acceptable quality Remarks: Monitoring data not easily obtained from R4LIMS. Data needs to be public released so other EPA staff can review the data electronically.
2.	Monitoring data suggests: ☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (bioremediation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☒ Needs Maintenance ☐ N/A

Remarks: Monitoring wells need more inspection. Wells found unsecured and damaged. Wells not clearly marked and labeled.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Since the Site Inspection occurred after the removal operation in 2002 and before the bioremediation pilot test in April 2005, there was not much to review or observe at the HSTC Site except for the adequacy of groundcover, fencing, land-use around the site, and the condition of the monitoring well network.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Some monitoring wells were found to either not have their wellhead bolted down, or were unlocked. One monitoring well located at the southeast corner of the property of Plant #2 was found to have a damaged wellhead (see Figure 3 for location and Figure11 for photograph). Due to the well being unlocked and not capped this well could be acting as a conduit for contamination from the surface to the groundwater via indiscriminate dumping of waste. This well could also be acting as a conduit for cross contamination between zones due to the integrity of the well casing being in question. This well is located at UTM Zone 17, Northing 2,897,813, Easting 584,716, NAD 1927

More inspection, maintenance, and repair of the monitoring wells should be added to the O&M program for the HSTC Site.

C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. As stated previously in part (B) of this section, more attention needs to be given to the inspection and repair of the monitoring wells located at the HSTC Site. One well was found damaged and is a potential source for contamination of the groundwater via indiscriminate dumping of wastes. The old injection well has still not been properly abandoned, as required in the ROD, and cited in the previous 2 two Five-Year Reviews.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. A QAPP and associated DQOs are required per EPA order 5360.1. As a part of developing the DQOs for the HSTC Site, it is recommended that an assessment be performed on which monitoring wells are needed for the continued assessment of the bioremediation remedy and which monitoring wells may be eligible to be abandoned. Abandonment of monitoring wells has occurred in the past. However, there still exists a plethora of monitoring wells in the groundwater monitoring network for the HSTC Site. If low value monitoring wells are found and abandoned, resources could be freed for items like the routine inspection and maintenance of the remaining groundwater monitoring network.